e-tendering in construction: time for a change?

Derek Lavelle* and Andrew Bardon*

ABSTRACT

e-tendering is one of the information technology tools that has been highlighted by construction industry experts to assist in changing the industry's culture and improving its processes. However the emergence of e-tendering in construction in the UK has been slow. This paper documents a questionnaire survey of quantity surveyors in northern England, identifying their views on different aspects of e-tendering, and providing an analysis of the perceived drivers and barriers to its implementation. Using a relative importance index, time and cost are confirmed as the two most significant perceived drivers in implementing e-tendering, while sustainability benefits are also recognised as important. The lack of experience and precedence in the legal realm is one of the main perceived barriers. The paper explores the impact of personal characteristics on attitudes towards e-tendering. Age and experience are particularly significant, with older and more experienced surveyors being more critical and negative than younger surveyors towards e-tendering. The analysis also identifies that the size and type of company affects attitudes with regard to electronic sharing of information and the related aspects of infrastructure and security. Smaller companies have more concerns with regard to security, while contractors' quantity surveyors have much more concern over sharing information than clients' consultants. Prior use also affects attitudes, with inexperienced users expressing more concerns over the use of e-tendering. The conclusion is that, amongst quantity surveyors, there is recognition of the benefits that e-tendering can bring about but that there are a number of barriers currently acting as a brake on the uptake of e-tendering.

Keywords: e-tendering, information technology, procurement, quantity surveyors.

**School of the Built Environment, Northumbria University, Newcastle upon Tyne, UK*
Email: derek.lavelle@northumbria.ac.uk

INTRODUCTION

e-tendering has been identified for some time as being one of the potential tools to assist in changing the construction industry's culture and improving its processes. The RICS e-tendering guidance note (2005) explains that at its simplest e-tendering is the electronic exchange of any tender documents as part of the procurement process. It is the administration of the tendering process that this research is focussed on, rather than the related but controversial topic of online auctions. The emergence of e-tendering in construction in the UK has been slow (BCIS, 2006). In the literature, a number of advantages and disadvantages have been identified in the use of e-tendering. This research documents a questionnaire survey of quantity surveyors in northern England, identifying their views on these different aspects of e-tendering, and exploring the reasons for the perceived slow uptake of the technology.

Advantages of e-tendering Systems

Sell (2005, p13) explains how time and cost savings can be gained. Avoiding the postal system leads to possible reductions in the tender period or use of previously abortive time to concentrate on the production of the tender. Printing costs will drop, as well as copying and postage costs, together with the associated staff time and overhead costs. Horsman (2001, p1) identifies research undertaken by the Office of Government Commerce (OGC) in 2001 which claimed that if a new web-based electronic tendering system was to replace the traditional tendering system in the purchasing of products and services for civil central government, it could produce savings of as much as £13 million in 4 years and reduce suppliers' tendering costs by £37 million over the same period.

The Foundation for Information Technology in Local Government (FITLOG) (2002, pp. 4–7) suggests that e-tendering creates greater transparency; it is easier to track the progress of tenders through internal systems, consequently keeping a ready made audit trail for both clients and contractors. There is the potential for faster and more accurate responses to questions and points of clarification during the tender period.

When tenders are returned electronically there is the potential for a fairer and fuller assessment of tenders with the use of computerised analysis. Additionally many web-based systems can check automatically for unusual or incomplete entries, reducing the need for additional communications, re-tenders and time spent at the analysis stage of the process. Brown (2006) also argues that paperwork held in electronic format is less likely to get lost or mislaid, either in the post or the office.

Additionally, Preston (2001) identifies further advantages as being the reduction in levels of tender administration and providing a single source of information. Also, there is no duplication of any tender documentation including sending multiple e-mails or copying disks, all tenderers have access to the same information all the time and version and revision control is inherent within the system.

Disadvantages of e-tendering Systems

The CRC Construction Innovation team (2006) explain that one of the main negative issues surrounding e-tendering is security threats impacting on the systems involved, including violations of data integrity and confidentiality.

e-tendering critics also point out that it must be considered whether companies are in a position to tender on-line. Research undertaken by the RICS E-Tendering Service in 2004 indicates a concern that the most economically viable contractor may not be selected if e-tendering is exclusively used to procure work. Tenderers may not have access to a computer, the internet or may not have the aptitude to use the associated systems. SME's in construction do not always readily incorporate internet use in their normal working patterns and some will still be reluctant to engage with projects that require engagement via the internet, despite social norms.

Concerns also exist within the industry with regards to the reliability and standard of the systems that are available to use (Zheng et al 2004). For a consultant QS to adopt an e-tendering web-based system and a

contractor to use it they need to be confident that it will not malfunction and can be relied upon.

Rankin et al (2005) also identify that problems arise with the communication and sharing of information through using e-tendering systems. For example, the contractor may have adequate skills, equipment and capabilities to complete tenders on line. But how do they communicate this information to their subcontractors who may not have such capabilities? This may also be a problem when the consultant QS is requiring input from the client, who again may have no such resource or aptitude to access the required systems (Ruikar, 2006).

A further challenge that exists in the successful implementation of e-tendering is converting the functionality of the traditional paper-based system to an electronic environment whilst maintaining legal compliance. Betts et al (2006) identify that the technology that facilitates e-tendering is relatively new and ever changing and as a consequence the law has not yet developed sufficiently to provide certainty of enforcement for electronic transactions.

In contrast to Preston, Zheng et al (2004) voice concerns over the choice of web-based tender systems that are available and identify that mobilisation costs may be significant for some participants and constant upgrading of IT systems will have to take place to ensure participants can continue tendering, consequently increasing the cost of utilising such methods.

These issues coupled with the fact that the construction industry is notorious for being slow to accept change, go some way to explaining the negativity that surrounds e-tendering. Booty (2004) identifies that people are often going to be scared of new ways of working. They need to be assured that the new method is as good, if not better than current methods.

Current level of use

A survey produced by RICS in late 2004 helps identify the levels of use of e-tendering and opinions towards e-tendering within the industry. 82% of the surveyors interviewed used e-tendering to some degree to send out tenders, compared with 54% stating they received tenders back by paper only. The comments that RICS received also identified that use of e-tendering was impacted by the size of a company involved; smaller firms often not having the technology or expertise to utilise such systems.

A second survey carried out by RICS early in 2005 asked 53 quantity surveyors if they had even used e-Tendering; of which 68% had, nearly 55% of these people however had only used simple disk or email exchange. Interestingly, nearly 80% of the people interviewed claimed their experience of using e-tendering to be positive and 85% saw e-tendering as an opportunity rather than a threat.

Although, accurate personal information i.e. gender, age, company were not fully disclosed from the survey, Clarke (2005) commented that the RICS IT conference saw a gulf develop between consultants and contractors – consultants claimed they nearly always sent out tenders electronically, whereas most contractors said they generally receive paper tenders.

Web-based e-tendering systems are becoming more popular and available. An example of this approach is when an organisation, such as the RICS, hosts an e-tendering service where tenders are let. All potential contractors wanting to participate or who have met required pre-qualification requirements are given a unique username and password to access the tender information available and upload their responses.

BCIS (2009) conducted a fresh survey to compare with earlier results. They report a growing use of electronic document transfers in the tendering arena, and an ongoing acceptance by the majority of respondents of the benefits of e-tendering. However, there remains a reluctance to use web-based online facilities (compared with physical media), and there has been no substantial change in client demand for e-tendering.

Public Sector Bodies have been set targets by central government for introducing electronic procurement systems (Fischer, 2005). Obviously as a result of these Public Procurement Directives the use of e-tendering is increasing in the public sector as local councils and other public body organisations have to implement e-procurement methods. Consequently, this has a knock-on effect on people selling to, or carrying out

work for public bodies and potentially makes e-tendering more prominent and aids with its implementation within the industry.

It is clear that varying views on e-tendering exist across the industry. In order to understand how the potential of e-tendering may be realised, it is important to identify these views and analyse if they remain constant across particular groups of personnel within the industry. This research focuses on quantity surveyors and identifies where significant differences of opinion exist, giving some insight into the nature of the barriers to more widespread implementation of e-tendering.

DATA ANALYSIS

100 questionnaires were sent out by email to quantity surveyors in the north east region of England, from which 57 responses were received. The majority of questionnaires were sent to contacts and known colleagues within the industry which no doubt has contributed to the high response rate. This may have produced biased responses, but this cannot be determined with any certainty. Needham & Dransfield (1995) explain that utilising a quota sampling technique ensures that questionnaires are sent to individuals who "fit the bill". Churchill (1999) also explains that using such a data collection technique saves a considerable amount of time and effort and normally a generalised fair sample is achieved.

The questionnaire lists the possible advantages and disadvantages of e-tendering, gleaned from various publications. Since the questionnaire was conducted, BCIS (2009) summarises the five key benefits associated with e-tendering as: lower administration costs / effort (printing, copying and distribution); better contractor access to information for sub-contractors; reduced effort in issuing clarifications; reduced timescale of tendering; and reduced effort in analysing tenders. This list is a close parallel to the list used in the questionnaire.

The respondents to the questionnaire were asked to rank the identified advantages and disadvantages of e-tendering on a scale of 1 (very important) to 5 (very unimportant).

Relative Importance Indices (RII) are calculated on participants' perceived advantages and disadvantages of e-tendering. This calculation puts the factors in rank order and indicates how much the top ranked is more important than the next and so on. It is calculated by:-

T= The total of the rankings of all participants

N = No. of respondents

H = The highest possible ranking

$$RII = \frac{T}{H \times N}$$

Table 1 illustrates the rank of each of the advantages after a relative importance index calculation has been carried out on the data:-

Table 1 Advantages of e-tendering and Relative Importance Index (RII)

Advantages	Total ranked score	(RII)	Rank
Reduce Time	120	0.42	1
Reduce Costs	126	0.44	2
Sustainability	140	0.49	3
Fairer	175	0.61	4
Communication	183	0.64	5

Time and cost are considered to be the most important advantages associated with e-tendering. Gebauer et al (1998) are in agreement with these results, confirming that the two most important measures for success in procurement processes are time and cost. Sustainability was ranked as the third most important advantage e-tendering can bring. As companies and individuals become more aware and under more pressure to act in an environmentally friendly manner and new legislation is introduced to make this happen this particular attribute is likely to become more important (Sell, P. 2005). Fairness and improved lines of communication are seen as less important.

Table 2 shows how the participants perceived the disadvantages of e-tendering. There is a much narrower range in the results compared to the perceived advantages.

Table 2 Disadvantages of e-tendering and Relative Importance Index (RII)

Disadvantages	Total ranked score	(RII)	Rank
Legal Issues	163	0.32	1
Hard to Share Information	166	0.32	2
Security concerns	171	0.33	3
Poor Systems	183	0.36	4
High Complexity	189	0.37	5
Poor Reliability	190	0.37	6

The most important disadvantages identified were the legal issues that surround the use of e-tendering, and the difficulty in sharing information and security concerns, with little difference in importance between these three. Julia-Barcelo (1999) is in agreement with these findings concluding that legal difficulties are one of the main barriers to e-tendering. Lack of specific legal regulations, different approaches and enforceability are concerns for potential users. Over time, legal regulations may catch up with the speedy development of e-tendering and consequently such concerns would be eased.

In examining security and reliability of electronic information exchange, Jennings (2001) suggests that the world wide web leaks like a sieve; data transmitted on it can be garbled, can reassemble wrongly at the other end, or can only display partially because of incompatible software.

The results of the questionnaire and the calculated relative importance index firstly indicate the variation in opinion that exists on both the perceived advantages and disadvantages of e-tendering. A further stage of data collection and analysis was undertaken to investigate whether a range of personal and job-related characteristics of the respondents have a bearing on the results. Each respondent was identified in terms of gender, age, role (clients or contractors QS), experience (number of years in the industry), size of company and whether or not any form of e-tendering had been used previously. The surveyors were provided with a list of statements and asked to identify how much they agreed or disagreed with them on a Likert scale of 1– Strongly Agree to 5– Strongly Disagree. The results are summarised in table 3.

Table 3 Summary of responses to statements

Statement	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Willingness to adopt e-tendering	11	8	14	19	5
Likely to save cost	12	20	10	10	5
Likely to save time	7	19	14	11	6
Likely to be fairer	2	16	11	16	12
Likely to be more sustainable	14	24	13	4	2
Concerns over security	5	15	18	15	4
Concerns over choice and quality of systems	11	9	9	21	7
Concerns over complexity and IT skill required	6	16	10	13	12
Concerns over reliability	4	12	15	19	7
Concerns over ability to share information	5	19	12	12	9
In future e-tendering is likely to supercede traditional methods	15	16	14	10	2

Chi-square and correlation coefficients were calculated to identify the impact on the responses of the variables of gender, age, role, experience, size of company and previous use of e-tendering. The chi-square results, showing which personal factors are significant in influencing opinions, are summarised in table 4.

Table 4 Summary of significant personal factors

Statement	Personal factors where significantly differing opinion existed
Willingness to adopt e-tendering	Age, experience
Likely to save cost	Age, experience
Likely to save time	Age, experience
Likely to be fairer	Size of company
Likely to be more sustainable	–
Concerns over security	Age, experience, size of company
Concerns over choice and quality of systems	Age, experience
Concerns over complexity and IT skill required	Age, experience, size of company, previously used
Concerns over reliability	Age, experience
Concerns over ability to share information	Job role
In future e-tendering is likely to supercede traditional methods	Age, experience

Table 4 identifies that the two personal factors that separate quantity surveyors' views on e-tendering the most are age and experience. This is the case in all but three of the questions asked. Size of company, job role and whether a quantity surveyor had used e-tendering or not also impacted to a lesser extent on quantity surveyors' opinions.

Once the chi-squared tests had identified where significant differences of opinion existed amongst quantity surveyors, correlation analysis was then undertaken to attempt to understand where the differing attitudes within the groups existed. Table 5 summarises the results of this analysis.

Table 5 Summary of correlation analysis results

Statement	How personal factors affect QS views on e-tendering
Willingness to adopt e-tendering	Younger and inexperienced QS are more willing to adopt e-tendering than older and experienced QS
Likely to save cost	Younger and inexperienced QS believe e-tendering can reduce costs more than older and experienced QS
Likely to save time	Younger and inexperienced QS believe e-tendering can reduce time more than older and experienced QS
Likely to be fairer	QS of larger companies believe e-tendering is fairer than those of smaller companies
Likely to be more sustainable	–
Concerns over security	Older and experienced QS have greater concerns of security of e-tendering than younger and inexperienced QS
	QS of smaller companies have greater concerns of security of e-tendering than QS of larger companies
Concerns over choice and quality of systems	Older and experienced QS have greater concerns over systems available than younger and inexperienced QS
Concerns over complexity and IT skill required	Older and experienced QS have greater concerns with the complexity of e-tendering than younger and inexperienced QS
	QS of smaller companies have greater concerns with the complexity of e-tendering than QS of larger companies
	QS who have not used e-tendering have greater concerns with the complexity of e-tendering than those who have
Concerns over reliability	Older and experienced QS have greater concerns with the reliability of e-tendering than younger and inexperienced QS
Concerns over ability to share information	Contractor QS have greater concerns over sharing information when using e-tendering than client QS
In future e-tendering is likely to supercede traditional methods	Younger and inexperienced QS believe e-tendering can take over from traditional methods more strongly than older and experienced QS

Age and experience have a significant impact on quantity surveyors' opinions and beliefs towards e-tendering. The results show that generally the older or more experienced a quantity surveyor is the more critical and negative they are towards e-tendering over most of the issues raised by the questions. Younger quantity surveyors are being educated in a highly technological era and therefore the thought of using information technology as part of the procurement process is not daunting and is more the norm. Tindsley and Stephenson (2008) suggest that many professionals in the industry recognise a requirement for increased implementation of e-tendering, but they feel that training, education and support from senior management are essential requirements for e-tendering to become widely accepted in the future. However it is possible that older, more experienced QSs have a more mature commercial perspective and are sceptical of the hype that surrounds initiatives based on new technology. The mixture of wariness and intransigence can act as a powerful brake on new initiatives, especially when these views are held by more senior individuals within the industry.

The size of company quantity surveyors worked for also had an impact on their opinions and beliefs on e-tendering. The chi-squared tests identified that company size affected a quantity surveyors concerns regarding the complexity of the systems available, the security of the systems available and the fairness of using e-tendering. The correlation analysis indicated that the smaller the company the quantity surveyor is employed by, then the more critical and negative they are towards e-tendering systems. Larger companies often have the infrastructure in place to provide training for such innovative systems and have dedicated IT departments to assist with the security, development and implementation of e-tendering. Aranda-Mena & Wakefield in Ruikar (2006) concur with this and identify that the adoption of e-procurement by SMEs in construction lags behind other organisations in the building sector. However, a number of public bodies have signed up to an SME concordat, which means they strive to use local small and medium sized firms. This may help to provide adequate support to smaller companies to help implement e-tendering and to overcome some of the concerns identified.

The concerns related to size of company may be linked to the contractors concerns over the sharing of information. Sub-contractors may not have the IT infrastructure, support and systems in place to deal with tender information in electronic format, leaving the contractor with the responsibility and the associated costs of printing any drawings or documents and getting the information to sub-contractors.

Previous experience of using e-tendering also affects a quantity surveyors opinions and beliefs, with those who had not used e-tendering having more concerns about the complexity of use than those who had. This indicates that quantity surveyors have a preconceived idea that using e-tendering is very complex, but that these concerns are eased once use is made of the technology.

From all the tests carried out it can be concluded that gender has no impact on a quantity surveyors opinions or beliefs towards e-tendering.

CONCLUSIONS

e-tendering purports to offer a range of advantages for improving the efficiency of the procurement process. However some disadvantages are also evident and there is a slow growth in the uptake of e-tendering, despite it being offered as a service by several IT companies and also by the RICS. The research has identified that age and experience are particularly significant factors in the attitudes of QSs towards e-tendering. Older, more experienced QSs are more likely to have significant reservations and concerns about implementing e-tendering on projects than younger, less experienced QSs. Also smaller companies may not have the technology or systems in place to be able to take part in e-tendering and may be unable to share information electronically in a reliable and efficient manner.

REFERENCES

Betts, M., Black, P., Christensen, S., Dawson, E., Du, R., Duncan, W. Foo, E. & Gonzalez, J. (2006) Towards Secure and Legal E-tendering. IT con, Vol.11, Special Issue e-commerce in construction, pg. 89–102.

BCIS (2006) 2006 eTendering Survey Report, RICS, 2006.

BCIS (2009) 2009 eTendering Survey Report, RICS, 2009.

Booty, F. (2004) "Does E-Tendering Represent the Future Marketplace?" Available at: www.rics.org/ricsms/bin/show?class=Feature&template=/includes/feature (Accessed 16 September 2008).

Brown, C. (2006) The Role of Electronic Documentation Improving Production Line Efficiencies. Available at: https://aerade.cranfield.ac.uk/bitstream/1826/1625/1/ Brown-2006.pdf (Accessed 10 October 2008).

Churchill, G.A. (1999) Marketing Research Methodological Foundations. 7th Edition. London: Harcourt Publishing.

Clark, P. (2005) "By switching to Online Tenders, Laing Homes Saved a Cool £200,000… So Why Are Most Firms Still Stuck In the Paper Jam?" Available at :www.qsnews.co.uk/srory.asp?storyType =176&sectioncode=567&storycode=3 (Accessed 10 October 2008).

CRC Construction Innovation (2006) eTendering – Security and Legal Issues. Brisbane: Australia: Icon.Net Pty Ltd. Available at: www.construction-innovation.info (Accessed 10 October 2008).

Fischer, K. (2005) "E-Procurement; More Competition, Less Red Tape? Construction Bulletin. October 2005. p5.

Foundation for Information Technology in Local Government (FITLOG) (2002) Electronic Procurement – A guide for councillors and managers. Hertford. pp 4–7.

Gebauer, J., Beam, C. & Segev, A. (1998) Impact of the internet on purchasing practices. Acquisitions Research Quarterly. Vol 5. No. 2 167–184.

Horsman, L. (2001) "Electronic Tendering System from the OGC". Available at: www.sourceuk.net/articles/a01619.html (Accessed 10 October 2008).

Jenning, D. (2001) Secure trading, Supply Management. London: ABI Inform Global.

Julia- Barcelo R.J. (1999) Electronic Contracts: a new legal framework for electronic contracts: the EU electronic commerce proposal. Computer Law & Security Report. Vol 15, no. 3.

Martin, J. (2007) – A E-Tendering in Construction. RICS. Available at: http://www.construct-it.org.uk/pages/events/members_meetings/May_2007/ presentations/Joe%20Martin%20-%20CIT%20MM%2016-05-07.pdf (Accessed 10 October 2008).

Martin, J. (2007) – B RICS IT E-Brief – E-tendering about time too. Available at: http://www.rics.org/RICSWEB/getpage.aspx?p=taZxnxk7FE-PjIuhtZoFiQ (Accessed 28th October 2008).

National e-Procurement Project NePP (2004) The Benefits of e-procurement. Available at www.nepp.org.uk Accessed 17 September 2008.

Needham, D. & Dransfield, R. (1995) Marketing Everybody's Business. 2nd Edition. Oxford: Heinemann.

Preston, A. (2001) "Paper Free Tendering – A 21st Century Alternative". Available at: www.publicservice.co.uk Accessed 15 September 2008.

Rankin, J.H., Yongie, C. & Christian A.J. (2005) E-Procurement in the Atlantic Canadian AEC Industry. Available at: http://itcon.org/2006/06 Accessed 28 October 2008.

RICS (2005) E-Tendering Guidance Note. Coventry: RICS Books.

RICS E-tendering Service (2004) – what are we doing with IT – Survey. Coventry: RICS Books.